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Strontium 90 Less an Ogre Than Painted, But How Much?

RADIOACTIVE STRONTIUM (Sr-90) ranks among the ugliest byproducts of nuclear fission and bomb testing. The 28-year half-life of this major ingredient of fallout constitutes a lingering reminder of our essays in worldwide pollution.

Sr-90 is known to concentrate in bone, and its main hazard is held to be the production of leukemia and other cancers by local irradiation of bone marrow cells. The average global burden from existing residues of Sr-90 has been calculated to be equivalent to a total dose of 80 millirads of radiation in bone marrow over the lifespan, which can be compared to 100 millirads per year form cosmic rays and other natural sources.

Fallout residues thus deliver only a small amount of radiation compared to background and are unlikely to add as many as one case of cancer per million per year to our existing miseries. Dr. Ernest J. Sternglass of the University of Pittsburgh has reignited public anxiety about Sr-90 with the suggestion that 400,000 infant deaths in the United States since 1950 are attributable to Sr-90 fallout from bomb testing.

The kernel of his argument is that infant death rates fell steadily between 1935 and 1950 and should have continued to drop at the same pace if there had been no fallout. On this argument, our infant mortality rate should have been reduced by now to 13 per 1000, but the rate has gone down more slowly since 1950 and is about 22. He arues that the difference, or 0.9 per cent of babies born in 1968, died as victims of fallout. This would imply that we have underestimated the lethality of Sr-90 by a factor of 1000.

THE COUNTRY deserves better science than this. Anyone who will take the time to follow Stengolass's argument will see that it is based on the unsupported assumption that mortality rates will continue to improve at a constant pace, taking no account of either the social-economic or the medical factors that dominate such statistics.

Suffice it to say that most of the improvement up to 1950 can be traced to the control of infection by antibiotics and general hygiene, while we have been much less successful in mitigating or preventing congenital malformations. Furthermore, nonwhite children not only started out behind white ones in 1950; their relative improvement since then has been much poorer than that of the whites.

Are we to say that black skin makes for higher sensitivity to Sr-90? What a convenient excuse not to do the hard work needed to clean up our national disgrace: that a child's chance to live depends on his race.

Dr. Sternglass's arguments are being taken apart, point by point, in technical publications by Drs. Arthur J. Tamplin of the Lawrence Radiation Laboratory, Livermore, Calif., and L. A. Sagan of Palo Alto, and I must concur with them that his method of analysis is incapable of yielding anything but imaginative speculations which the alleged data neither prove nor disprove.

Dr. Sternglass's "expose" has nevertheless called attention to a surprising lack of experimental work directed specifically at the genetic effects of Sr-90. In part, this lack stems from a preoccupation with the similarity of Sr-90 to radium and its concentration in bone. More important, we still have an incomplete scientific base on which to ask the right questions about the effects of radioisotopes on DNA and chromosomes. We do know that these questions are important.

THE ONE published study I could find was reported in 1963 by the respected Stockholm geneticist K.G. Luening. He gave huge doses of Sr-90 to male mice, which were then mated. Among their offspring, the proportion of dead embryos increased to 12.3 per cent, compared to 7.8 per cent for the controls. But if we extrapolated the doses back to our own load of Sr-90, the effect would be imperceptible.

Dr. Luening's studies do not lend themselves to exact quantitative analysis, however, and no one has made a thorough examination of the genetic effects of chronic exposure to moderate doses of Sr-90.

It is known that Sr-90 decays to an unstable isotope, yttrium-90, which has a half-life of 64 hours and very different chemical properties from those of Sr-90. Since yttrium is distributed through soft tissues, unlike strontium, it is not farfetched to question whether it exerts some genetic effects either by general radiation or by more specific association with DNA. Radioactive decay of atoms (like phosporus-32) actually incorporated in the DNA molecule is known to have a disproportionate effect in producing genetic damage.

My imagination does not permit me to stretch these uncertainties to 400,000 infant deaths. We may be dealing with less than 1 per cent of that burden. But if we play with fire, we ought to maintain a higher level of unremitting skepticism and vigilant research, or in the end we will learn the hard way.